

REMARKS

Disposition of the Claims

The Examiner has rejected Claims 1-22 and 24-26 under 35 U.S.C. 103(a) as being unpatentable over Hutchings et al. (U.S. Patent No. 3,076,841) in view of Harrison et al. (WO 01/70830) and Nicolet (U.S. Patent No. 4,321,214).

The Examiner has rejected Claims 23 and 27 under 35 U.S.C. 103(a) as being unpatentable over Hutchings in view of Harrison and Nicolet as applied to Claims 1-22 above, and further in view of Gragson et al. (U.S. Patent No. 3,384,585).

Summary of the Invention

Before considering the rejection, it is believed that a brief review of the present invention will be helpful.

Applicants have discovered an improved process for making polyalkenyl sulfonic acids and the corresponding overbased sulfonates. In particular, the Applicants' invention employs a polyalkenyl sulfonic acid treatment step. This step treats the reaction product and by-products of polyalkene and sulfur trioxide (i.e., polyalkenyl sulfonic acid, sulfuric acid, recovered polyalkene sulfones, and sulfur trioxide) prior to the polyalkenyl sulfonic acid being overbased in a subsequent reaction. The treatment step stabilizes the polyalkenyl sulfonic acid product and by-products by neutralizing the acid with a neutralizing agent, such as an alkaline earth metal hydroxide. This treatment step takes place within a narrow range of time (i.e., between 2 seconds and one hour) and before further processing the polyalkenyl sulfonic acid.

35 U.S.C. § 103 (a) Rejection of Claims 1-22 and 24-26

Applicants respectfully request reconsideration and withdrawal of the 35 U.S.C. 103(a) rejection of Claims 1-22 and 24-26 as being unpatentable over Hutchings et al. (U.S. Patent No. 3,076,841) in view of Harrison et al. (WO 01/70830) and Nicolet (U.S. Patent No. 4,321,214).

In order for a patent application to be deemed unpatentable under 35 U.S.C. §103(a), the Examiner has the burden of establishing that the Applicants' invention would be obvious in view of the cited reference(s).

In accordance with 35 U.S.C. §103(a), the Examiner must adhere to the factual inquiries that were established in *Graham v. Deere*. In order to determine obviousness, the Examiner must apply and adhere to the following:

- (a) Determine the scope of the contents of the prior art.
- (b) Ascertain the differences between the prior art and the claims at issue.
- (c) Resolve the level of ordinary skill in the pertinent art.
- (d) Consider objective evidence present in the application indicating obviousness or nonobviousness.

The Manual of Patent Examining Procedure gives guidance as to how obviousness should be determined in view of the U.S. Supreme Court's ruling in *KSR International Co. v. Teleflex Inc. (KSR)*, 550 U.S. ___, 82 USPQ2d 1385 (2007).

The Supreme Court in *KSR* noted that the analysis supporting a rejection under 35 U.S.C. 103 should be made explicit. The Court quoting *In re Kahn*, 441 F.3d 977, 988, 78 USPQ2d

1329, 1336 (Fed. Cir. 2006), stated that “[R]ejections on obviousness cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” KSR, 550 U.S. at ___, 82 USPQ2d at 1396. Exemplary rationales that may support a conclusion of obviousness include:

(A) Combining prior art elements according to known methods to yield predictable results;

(B) Simple substitution of one known element for another to obtain predictable results;

(C) Use of known technique to improve similar devices (methods, or products) in the same way;

(D) Applying a known technique to a known device (method, or product) ready for improvement to yield predictable results;

(E) “Obvious to try” – choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success;

(F) Known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations are predictable to one of ordinary skill in the art;

(G) Some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention. MPEP §2141 (Sept. 2007).

Respectfully, the Examiner has failed to establish a prima facie case of obviousness.

The Examiner has failed to adhere to the factual inquiries established in *Graham v. Deere*. For example, the Examiner has failed to ascertain the differences between the prior art and the claims at issue. Applicants submit that the Examiner has merely provided conclusory statements, which the Supreme Court has stated are impermissible, to support the obviousness rejection.

With respect to Claims 1-22, Applicants submit that Hutchings in view of Harrison fails to teach or suggest the presently claimed invention. Specifically, the Examiner states that Hutchings teaches a method of preparing a sulfonate which includes a sulfonation step and a neutralization step. However, there is no teaching or suggestion in the Hutchings reference alone, or in combination with Harrison and Nicolet, that the stabilization of a polyalkenyl sulfonic acid by neutralization decreases the degradation reactions of the polyalkenyl sulfonic acid and the formation of sultones and fragmentation products. By contrast, Applicants clearly demonstrate that undesirable sultone formation is decreased when a PIB sulfonic acid is stabilized by neutralization (see Table II of Applicants' specification) and that the undesirable formation of lower molecular weight polyalkenyl sulfonic acids (C₈ and C₁₂ PIB sulfonic acids) is decreased when a PIB sulfonic acid is stabilized by neutralization (see Table I of Applicants' specification).

The Examiner states that "Harrison teaches that polyalkenyl sulfonates, as recited in Claim 1, can be made by the process of sulfonation and neutralization, where polyalkenes are reacted with SO₃ in the sulfonation step." Applicants assert that, although Harrison teaches polyalkenyl sulfonic acids and methods of preparation, the reference is completely silent to the problem of degradation reactions of the polyalkenyl sulfonic acids prepared by the methods described therein and the formation of sultones and fragmentation products.

The Examiner states that "one of ordinary skill in the art is incorporating Nicolet's teaching about the limited storage stability of hydrocarbon sulfonic acid into the process of Hutchings, and therefore performing the neutralization reaction as quickly as possible." Nicolet teaches only that undesirable impurities found in the sulfonic acid

caused deterioration of the sulfonic acid during processing and reduced the storage stability of the sulfonic acid and the subsequent sulfonates. These impurities include sulfuric acid, water, reaction sludge and calcium sulfate (see column 1, lines 39-47). Applicants submit that the presently claimed invention, which addresses the problem the problem of reduced storage stability of polyalkenyl sulfonic acids, is not related to impurities described by Nicolet but to undesired side reactions which occur when a polyalkene reacts with sulfur trioxide (SO_3) thereby resulting in the degradation of the polyalkenyl sulfonic acid, the formation of sultone molecules and the formation of lower molecular weight polyalkenyl sulfonic acids from fragmentation reactions. The thermal stability of polyalkenyl sulfonic acids is clearly improved when a polyalkenyl sulfonic acid has been stabilized by neutralization. The data in Figures 1 and 2 of the Applicants' specification show that a PIB sulfonic acid derived from SO_3 /air sulfonation is not thermally stable and that the amount of the desired PIB sulfonic acid decreases when stored at moderate temperatures (40°C and 60°C) whereas Figure 3 of the Applicants' specification shows that a PIB sulfonic acid prepared by SO_3 /air sulfonation followed by stabilization of a PIB sulfonic acid by neutralization is thermally stable as demonstrated by the fact that the % Ca sulfonate of the stabilized PIB remains approximately constant for at least 21 days at moderate temperatures (40°C and 60°C).

Furthermore, the Examiner states that amended Claims 24-26 are further rejected over Hutchings in view of Harrison and Nicolet as Hutchings teaches in column 5 lines 1-20 the overbasing of a neutralized sulfonate. Applicants assert that Hutchings in view of Harrison and Nicolet as Hutchings teaches in column 5 lines 1-20 the overbasing of a neutralized sulfonate fails to teach or suggest the presently claimed invention. Specifically, column 1 lines 10-11 of Hutchings teaches a method for preparing basic metal salts of oil-soluble *petroleum* sulfonic acids. Petroleum sulfonic acids are "by-products at the production of white oils by treatment with oleum. The resulting acid tar contains long chain *alkylarylsulfonic acids* that can be neutralized with lyes" (see T. Mang and W. Dresel, *Lubricants and Lubrications*, Wiley-VCH, 2001, p. 111). By contrast, the sulfonic acid employed in the presently claimed invention is a *polyalkenyl* sulfonic acid and not an *alkylarylsulfonic acid* which is the "make-up" of the petroleum

sulfonic acids which are found in Hutchings. There is no teaching or suggestion in Hutchings that an overbased sulfonate may be derived from a polyalkenyl sulfonic acid. Hutchings merely discloses a process for overbasing metal petroleum sulfonates.

One of ordinary skill in the art would not have been motivated to combine (A) Harrison and Nicolet with (B) Hutchings because (A) and (B) are not directed to same types of sulfonic acids. There is no likelihood of success in obtaining the presently claimed invention based upon Hutchings, Harrison and Nicolet. There is no teaching, suggestion or motivation in these references to stabilize a polyalkenyl sulfonic acid by neutralization to solve the problem of the degradation reactions of a polyalkenyl sulfonic acid and the formation of sultones and fragmentation products.

Accordingly, Applicants submit that one of ordinary skill in the art would not have been motivated to modify the teachings of the Hutchings, Harrison and Nicolet references to obtain the presently claimed invention. The Applicants assert that the Examiner has failed to establish a prima facie case of obviousness. Accordingly, Applicants request withdrawal of the 35 U.S.C. § 103 (a) rejection of Claims 1-22 and 24-26.

35 U.S.C. § 103 (a) Rejection of Claims 23 and 27

Applicants respectfully request reconsideration and withdrawal of the 35 U.S.C. 103(a) rejection of Claims 23 and 27 under 35 U.S.C. 103(a) as being unpatentable over Hutchings in view of Harrison and Nicolet as applied to Claims 1-22 above, and further in view of Gragson et al. (U.S. Patent No. 3,384,585).

Applicants assert that the Examiner has failed to establish a prima facie case of obviousness. The Examiner has failed to provide a reasoning to support his conclusion of obviousness, as set forth in *KSR* which has been discussed herein above. The discussion of obviousness has been set forth above and is incorporated in this and other responses to the obviousness rejections.

The Examiner states that Gragson employs an overbasing pressure that lies within the range of the presently claimed invention (Claim 23) and that Claim 27 contains the same limitation as Claim 23. Applicants submit that Gragson teaches a method of overbasing metal *petroleum* sulfonates. Petroleum sulfonic acids are “by-products at the production of white oils by treatment with oleum. The resulting acid tar contains long chain *alkylarylsulfonic acids* that can be neutralized with lyes” (see T. Mang and W. Dresel, Lubricants and Lubrications, Wiley-VCH, 2001, p. 111). By contrast, the sulfonic acid employed in the presently claimed invention is a *polyalkenyl* sulfonic acid. There is no teaching or suggestion in Gragson that the overbased sulfonate may be derived from a polyalkenyl sulfonic acid. Gragson merely discloses a pressure range for overbasing metal petroleum sulfonates. One of ordinary skill in the art would not have been motivated to combine Gragson with

Accordingly, Applicants submit that one of ordinary skill in the art would not have been motivated to combine the teachings of Hutchings in view of Harrison and Nicolet, as applied to Claims 1-22 above, and further in view of Gragson to obtain the presently claimed invention. The Applicants assert that the Examiner has failed to establish a prima facie case of obviousness and respectfully request withdrawal of the 35 U.S.C. § 103 (a) rejection of Claims 23 and 27.

Conclusion

It is respectfully submitted that the references fail to teach or suggest Applicant's presently claimed invention.

For the reasons stated, Applicants submit that this application is in condition for allowance and notice to that effect is earnestly solicited.

The Director of Patents is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account Number 03-1620 for the above-referenced patent application.

Respectfully submitted,

A handwritten signature in dark ink, appearing to read "Josetta I. Jones", is written over a horizontal line.

Josetta I. Jones

Attorney for Applicant

Reg. No. 51,368

(925) 842-1593

JIJ:kj

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